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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,179	01/21/2004	Shahriar Vazan	D/A3412	4777

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EXAMINER

PHAM, HAI CHI

ART UNIT	PAPER NUMBER
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2861

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/762,179	VAZAN, SHAHRIAR	
	Examiner	Art Unit	
	Hai C. Pham	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on RCE & Amendment (10/30/06).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-12, 14-18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-12, 14-18 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request For Continued Examination

1. The request filed on 10/30/06 for a Continued Examination (RCE) under 37 CFR 1.114 based on parent Application No. 10/762,179 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 7, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (US 6,876,371) in view of Konnunaho et al. (US 6,603,498) and Hori (JP 9-90253).

With regard to claim 1, Suzuki et al. discloses a multi-beam raster output scanner comprising a photoreceptor (photoreceptor 12), an array of vertical cavity emitting laser light sources (VCSEL array 50) to produce light beams directed to said photoreceptor, an array of photodetectors (light amount sensor 58 for detecting the light amount of each of the VCSEL element) (Fig. 5), a beam splitter (half mirror 54) (Fig. 3) for deflecting the light beams emitted from the VCSEL light sources onto the light amount sensor (58), said half mirror being substantially angled relative to the array of the

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vertical cavity surface emitting laser light sources so that said array of photodetector array may be conveniently located as distinctly separate from said array of vertical cavity surface emitting laser light sources (Fig. 3), and an array of feedback loops for simultaneously adjusting beam intensity using the drivers (laser drive device 86) for each said light beam, wherein each of the drivers uses said photodetector array as a reference source to adjust for parallel beam to beam uniformity correction produced by said array of light sources (the light amount sensor 58 simultaneously receives the reflected light beams emitted by the VCSEL array 50 via the half mirror 54, the detected light amount of each of the VCSEL element is compared to the light amount setting value to provide the drive amount setting signal for each individual laser element so as to correct the drive current supplied to the individual laser element so as to expose the photoreceptor with a uniform and efficient intensity) (col. 2, lines 42-59) (col. 35, lines 13-34) (Fig. 5). With regard to claim 14, Suzuki et al. further teaches using either a one-dimensional array of VCSELs or a two-dimensional array of VCSELs as light sources (col. 33, lines 13-40) (Fig. 4).

Suzuki et al. fails to explicitly teach the VCSEL drivers being programmable drivers.

Konnunaho et al. discloses an image forming apparatus for forming an image on the surface of the photoreceptor (drum 102), the apparatus comprising a linear array of individually addressable laser diodes (24) and a linear array of photodetectors (36), a programmable driver (driver ASIC 40) for modulating the current supplied to each of the laser diodes in the array so as to maintain the output power of the laser diodes at a

uniform level (col. 4, lines 6-18), a calibration value for each of the laser diodes used to determined the same target or nominal output power of each of the light beams (26) emitted toward the photoreceptor (col. 4, lines 26-39).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide programmable drivers to independently drive each of the light emitting elements in the VCSEL array to the device of Suzuki et al. as taught by Konnunaho. The motivation for doing so would have been to keep the light output of the individual light emitting elements constant as suggested by Konnunaho et al.

Suzuki et al. also teaches a light amount setting unit (90) for controlling the drive amount for each of the laser elements in the array, but fails to explicitly indicate that the light amount setting values being the calibrated uniformity values corresponding to each light beam as determined by the intensity of the beam on the photoreceptor.

Hori teaches an optical scanning device wherein the light quantity values of the laser diodes in the laser chip (13) for providing a uniform distribution on the photoreceptor (19) are stored as reference values in the reference value generating circuit (23) for controlling the light output of the laser diodes as it is detected by the photodiode (13) (see Abstract).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the device of Suzuki et al. with the calibration values as taught by Hori. The motivation for doing so would have been to uniformize the

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light quantity distribution on the photoreceptor independent of the fluctuations in the sensitivity of the photoreceptor.

The method claim 7 is deemed to be clearly anticipated by functions of the above structures.

4. Claims 2-4, 8, 10-11 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. in view of Konnunaho et al. and Hori, as applied to claims 1, 7, 14 above, and further in view of Rajeswaran (U.S. 5,917,534).

Suzuki et al., as modified by Konnunaho et al. and Hori, discloses all the basic limitations of the claimed invention including using a memory for storing the calibration values for each of the lasers (Konnunaho et al., col. 4, lines 32-33) and a well known conventional method for correcting the non-uniformity of the output power of the individual light emitting elements, but fails to explicitly disclose the digital to analog converters, the coefficients values for compensating for aging effects.

Rajeswaran discloses an image forming apparatus having an LED print head comprising light-emitting diode arrays with integrated photodetector arrays disposed in a one-to-one relationship, and provided with an array of feedback loops for correcting the non-uniformity of the light output of each of the light-emitting diodes due to aging of the light-emitting diodes (col. 13, lines 23-61), the feedback loop including a digital to analog converter (61, Fig. 13) for converting the digital signal stored in the target data register (62) so as to control the current driver (65) to adjust the current to the LED (Fig. 13) (col. 9, line 55 to col. 10, line 11). Rajeswaran further teaches using register (LCU

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175, Fig. 17) for storing the empirically determined correction values for the target data to control the current driving the light-emitting diodes to compensate for the aging effects (col. 9, lines 29-54) (col. 13, lines 44-61).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the digital to analog converters for converting the digital signal stored in the target data memory in the modified device of Suzuki et al. as taught by Rajeswaran. The motivation for doing so would have been to correct the non-uniformity of the light output of the light emitting diodes in real time.

5. Claims 5, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. in view of Konnunaho et al., Hori and Rajeswaran, as applied to claims 1, 7 above, and further in view of Kamimura (U.S. 6,266,077).

Suzuki et al., as modified by Konnunaho et al., Hori and Rajeswaran, discloses all the basic limitations of the claimed invention except for the correction values being mathematically derived.

Kamimura discloses a feedback loop control device for compensating the output variations in a printing head, which comprises an LED array (15), the feedback control loop including a non-volatile memory (13) for storing the coefficient values for correction based on the summation/average of the measured light output of the LEDs or a piecewise linear function (col. 6, line 65 to col. 7, line 9).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a linear transformation or a summation/averaging

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method to derive the coefficient values for correcting the non-uniformity of the light output in the device of Suzuki et al. as taught by Kamimura. The motivation for doing so would have been to not only correcting the output variations of each of the light emitting diodes but also to uniformly control the light output across the entire set of the light emitting elements in the array.

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. in view of Konnunaho et al. and Hori, as applied to claim 14 above, and further in view of Kamimura.

Suzuki et al., as modified by Konnunaho et al. and Hori, discloses all the basic limitations of the claimed invention except for the correction values being mathematically derived.

Kamimura discloses a feedback loop control device for compensating the output variations in a printing head, which comprises an LED array (15), the feedback control loop including a non-volatile memory (13) for storing the coefficient values for correction based on the summation/average of the measured light output of the LEDs or a piecewise linear function (col. 6, line 65 to col. 7, line 9).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a linear transformation or a summation/averaging method to derive the coefficient values for correcting the non-uniformity of the light output in the device of Suzuki et al. as taught by Kamimura. The motivation for doing so would have been to not only correcting the output variations of each of the light emitting

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diodes but also to uniformly control the light output across the entire set of the light emitting elements in the array.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. in view of Konnunaho et al. and Hori, as applied to claim 14 above, and further in view of Ema et al. (U.S. 6,118,798).

Suzuki et al., as modified by Konnunaho et al. and Hori, discloses all the basic limitations of the claimed invention except for the 8-bit digital to analog converter.

Ema et al. discloses a semiconductor laser control system for adjusting the light output of the laser used in a laser printer, the system including a feedback loop having a 5-bit digital to analog converter for correcting the drive current of the laser. Ema et al. further suggests increasing the number of bits of the digital to analog converter so as to obtain a higher accuracy.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate a high bit digital to analog converter in the control device of Suzuki et al. as taught by Ema et al. for the purpose of providing a highly accurate control system for adjusting the drive current of the light emitting diodes.

Response to Arguments

8. Applicant's arguments with respect to claims 1-5, 7-12, 14-18 and 20 have been considered but are moot in view of the new grounds of rejection.

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Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



HAI PHAM
PRIMARY EXAMINER

February 3, 2007